BAKER DRIVETRAIN

PREMIUM DRIVETRAIN INNOVATIONS
FOR AMERICAN MOTORCYCLES

INSTALLATION INSTRUCTIONS

FOR

BIG TWIN SIX-SPEED OVERDRIVE BUILDER'S KITS

&

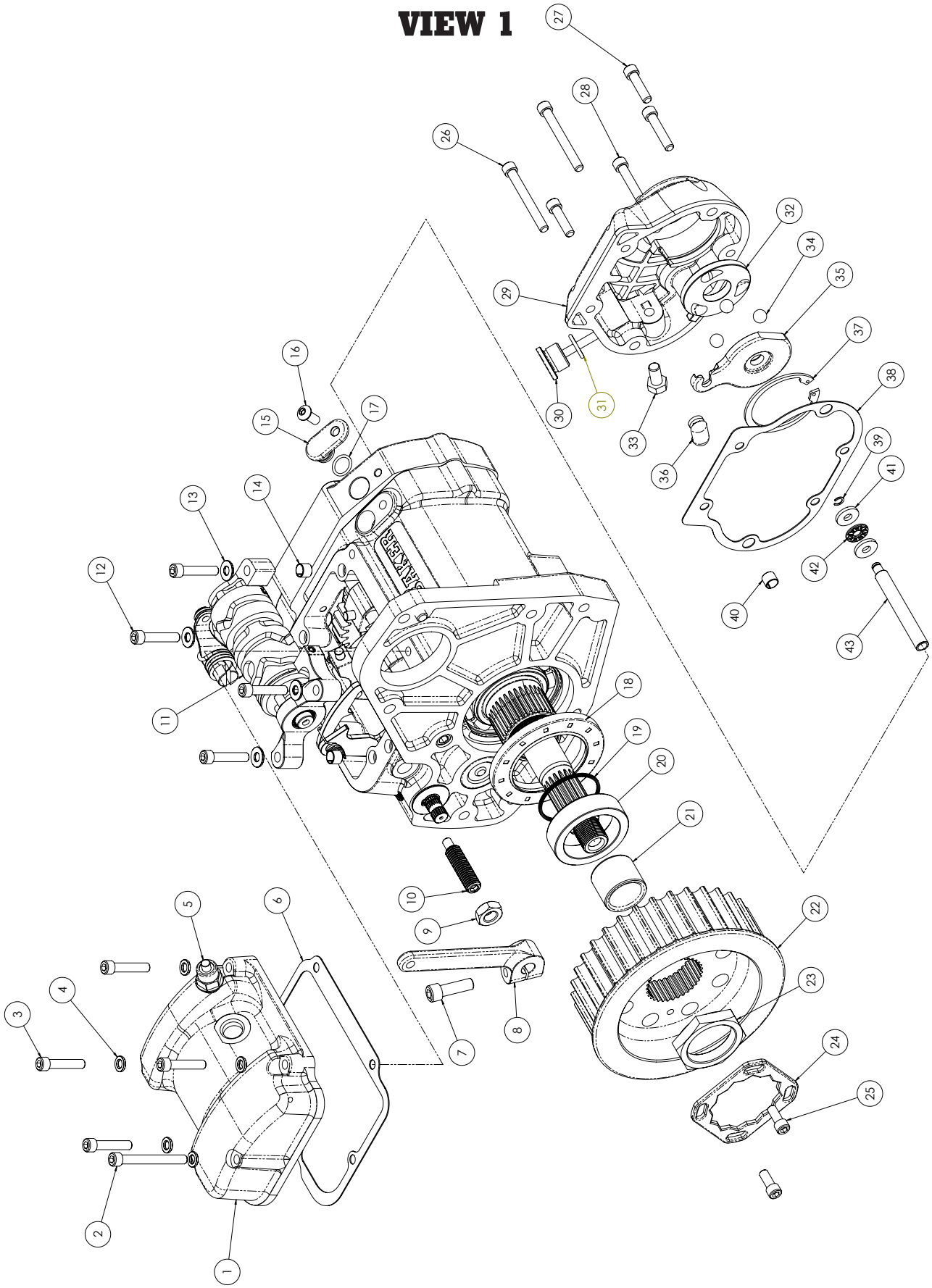
SERVICE GUIDE

FOR

BIG TWIN SIX-SPEED OVERDRIVE COMPLETE ASSEMBLIES

9804 E. SAGINAW HASLETT, MI. 48840 - PHONE: (517) 339-3835 - FAX: (517) 339-4590 - TOLL FREE: 1-877-640-2004

OD6 EXPLODED VIEW - COMPLETE ASSEMBLY
VIEW 1

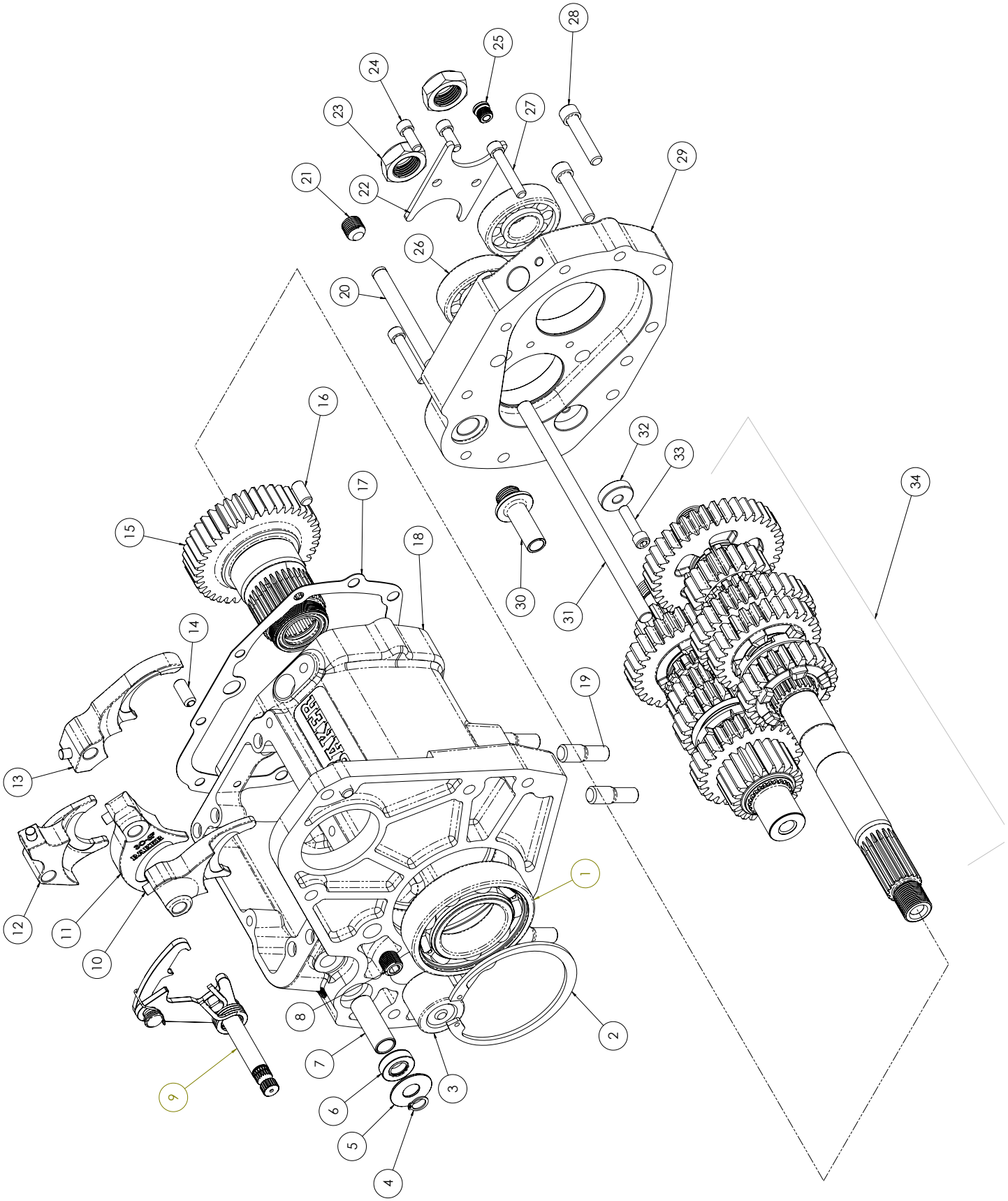


THE FOLLOWING PARTS ARE INCLUDED AS SHOWN IN:
OD6 EXPLODED VIEW - COMPLETE ASSEMBLY
VIEW 1

Number	Part Number	Qty	Description
1	34468-56A	1	Top Cover
2	25C225KCSS/P	1	1/4-20 x 2.250” SHCS Bolt
3	25C125KCSS/P	4	1/4-20 x 1.250” SHCS Bolt
4	6099SS	5	Washer, Top Cover
5	33900-59	1	Neutral Switch
6	34904-86E	1	Gasket, Top Cover
7	31F100KCSS/P	1	5/16-24 x 1.000” SHCS Bolt
8	33715-85S	1	Shift Lever
9	70183	1	7/16-14 Nut
10	152-56A	1	Eccentric Screw
11	5-6QEN-A	1	Shift Drum Assembly
12	23207	4	1/4-20 x 1.250” SHCS Bolt
13	33001	4	Washer, Shift Drum
14	609B	6	Alignment Dowel
15	108-6EP	1	Plug, Speed Sensor
16	73753	1	1/4-20 x .625” BHCS Bolt
17	66808	1	O-Ring, Sensor Plug
18	12067B	1	Seal, Main Gear
19	11165A	1	Quad Seal
20	33344-94S	1	Spacer
21	34091-85	1	Bearing Race
22	*	1	Pulley
23	35211-91B	1	Pulley Nut
24	40251-92A	1	Lock Plate
25	23202	2	1/4-20 x .625” BHCS Bolt
26	25C225KCSS/P	2	1/4-20 x 2.250” SHCS Bolt
27	25C100KCSS/P	2	1/4-20 x 1.000” SHCS Bolt
28	25C125KCSS/P	2	1/4-20 x 1.250” SHCS Bolt
29	597-56C	1	Side Cover
30	130-56C2	1	Dip Stick 2-Piece
31	66827	1	O-Ring, Dip Stick
32	25452-87A	1	Inner Ramp
33	18052	1	5/16-24 x .625” Hex Bolt
34	987678	3	3/8” Ball
35	25453-87A	1	Outer Ramp
36	34920-86	1	Coupler
37	68067	1	Snap Ring, Ball and Ramp
38	36801-87B	1	Gasket, Side Cover
39	10705-01149	1	E-Clip, Actuator Rod
40	609B	1	Alignment Dowel
41	TWC411	2	Washer, Actuator Rod
42	TC411	1	Bearing, Actuator Rod
43	37089-84L	1	Actuator Rod

* = Customer Preference

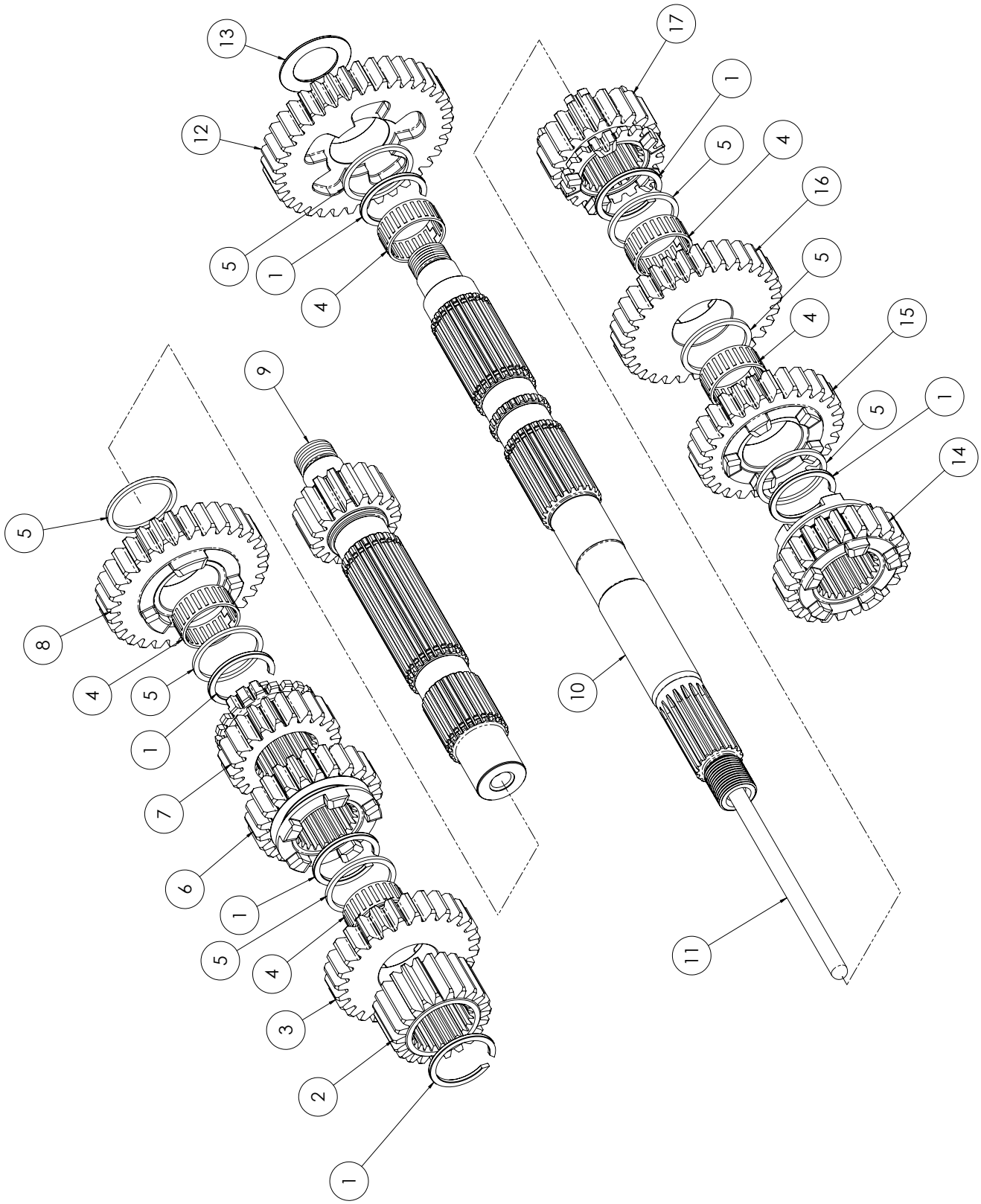
OD6 EXPLODED VIEW - COMPLETE ASSEMBLY
VIEW 2



THE FOLLOWING PARTS ARE INCLUDED AS SHOWN IN OD6 EXPLODED VIEW - COMPLETE ASSEMBLY VIEW 2

Number	Part Number	Qty	Description
1	6209	1	Bearing, Main Gear
2	1302-334PP	1	Snap Ring, Main Gear
3	BK2526	1	Bearing, Countershaft
4	1400-43PP	1	Snap Ring, Shifter Pawl
5	6497HW	1	Washer, Shifter Pawl
6	12045	1	Seal, Shifter Pawl
7	33114-79	1	Bushing, Shifter Pawl
8	25702	1	Plug, Fork Rod
9	555-56A	1	Shifter Pawl assembly
10	101-56	1	Fork, 2M
11	102-6F	1	Fork, 3C
12	102-6E	1	Fork, 4C
13	101-6E	1	Fork, 1M
14	64273	1	Dowel, Door
15	61005M	1	Main Gear, 5M
16	26770	1	Dowel, Door 5/16 X 1.000” Solid
17	35652-79B	1	Gasket, Door
18	204C-56P	1	Case
19	11733A	5	Stud, Case
20	112-6E	1	Aux Fork Rod
21	3784C	1	Plug, Aux Fork Rod
22	103-6	1	Retaining Plate
23	37141	2	3/4-16 Jam Nut
24	23202	2	1/4-20 x .625” SHCS BOLT
25	51740-001	1	Zero Leak Drain Plug
26	6304	2	Bearing, Door
27	25C150KCSS/P	2	1/4-20 x 1.500” SHCS BOLT
28	31C150KCSS/P	4	5/16-18 x 1.500” SHCS BOLT
29	2-6B	1	Door
30	115-6E	1	Pecker, Support Bridge
31	122-6	1	Fork Rod
32	F1409	1	Magnet
33	23205	1	1/4-20 x 1.000” SHCS BOLT
34	See View 3	1	Gear Set Assembly

OD6 EXPLODED VIEW - GEARSET
VIEW 3



THE FOLLOWING PARTS ARE INCLUDED AS SHOWN IN OD6 EXPLODED VIEW - GEARSET VIEW 3

Number	Part Number	Qty	Description
1	11067	6	Retaining Ring
2	61005C	1	5th Gear Countershaft
3	603M2C	1	2nd Gear Countershaft
4	8876A	5	Bearing
5	6003B	7	Thrust Washer
6	61573C	1	3rd Gear Countershaft
7	61234C	1	4th Gear Countershaft
8	62941C	1	1st Gear Countershaft
9	60866C	1	Countershaft with 6th Gear
10	60000M	1	Mainshaft
11	37088-90	1	Clutch Release Rod
12	60866M	1	6th Gear Mainshaft
13	AS2035	1	Shim, Mainshaft
14	62212M	1	2nd Gear Mainshaft
15	603M2C	1	3rd Gear Mainshaft
16	61234M	1	4th Gear Mainshaft
17	62941M	1	1st Gear Mainshaft

APPLICATION AND REQUIRED HARDWARE

A Builder's Kit is, as the name implies, for building a BAKER Six-Speed Overdrive™ Transmission using an existing case/housing and peripheral hardware. The following 5-speed components are required to complete the task:

Transmission Housing*
Pawl and sprocket spacer seals
Shifter pawl assembly
Top cover and fasteners
Neutral switch
Clutch release cover and fasteners
Clutch release mechanism and push rod hardware

**1) H-D® Transmission housings come with the left side bearings installed and, in the case of the Softail®, with transmission mounting plate studs installed. These items may have to be purchased separately when using aftermarket cases.*
2) Since the speed sensor provision for the BAKER™ Six Speed is in the side door, it is not necessary to purchase a transmission case with speed sensor provisions.

CONTENTS

Figure 1 shows an illustration of the contents of the Builder's Kit.

FORWARD

We highly recommend that the BAKER™ Builder's Kit be installed only by trained and/or seasoned mechanics with prior
H-D® 5-speed experience. **If you have never serviced an H-D® 5-speed, do not attempt this installation project.**

REQUIRED READING

Regardless of the skill level or experience of the individual installing the Builder's Kit, it is highly recommended that a genuine H-D® Motor Company Parts Catalog and Factory Service Manual be available for reference for the installation. The installation instructions for the BAKER Six-Speed will make frequent reference to the Factory Service Manual. Any Factory Service Manual from 1990 on will be sufficient.

SPECIAL TOOLS

The only special tools required are tools that would also be required for any 5-speed installation.

For installing/ removing the main drive gear and main drive gear bearing, HD-35316A is available through your local Harley Davidson® Dealer. The equivalent tool TOOLA-56 is available through BAKER DRIVETRAIN™.

For removing and installing the bearing inner race on the transmission mainshaft, H-D® 34902A is required. The BAKER DRIVETRAIN™ equivalent part is TOOLB-56.

For removing and installing the 1-7/8" transmission sprocket nut, H-D® 9466--37A is required. The BAKER DRIVETRAIN™ equivalent part is TOOLD-56.

INSTALLATION INSTRUCTIONS

CASE PREPARATION/ GEARSET REMOVAL

If the Builder's Kit is replacing/refreshing an existing 5-speed, refer to your Factory Service Manual Section 7, MAINSHAFT/COUNTERSHAFT Removal. Follow REMOVAL procedure.

Next, refer to section 7, MAIN DRIVE GEAR removal, follow REMOVAL procedure.

If the Builder's Kit is going into a new case, no preparation is required.

CASE CLEARANCE CHECKS

The BAKER Six-Speed Overdrive™ hardware is designed to fit in stock H-D® cases without modification to the case to Six-Speed Components. Since most aftermarket cases are styled after the H-D® equivalent, the hardware usually fits in most situations, but there are exceptions. The internal walls of cases 'float around' occasionally in H-D® and aftermarket castings. This is not an indication of a quality problem, but rather this is inherent in the casting process.

CHECK #1 - 6TH GEAR MAINSHAFT CLEARANCE

Place the side door gasket provided onto the dowel pins of the case. This gasket is your template Figure 2 shows the area of concern that has to be checked with the 'template'.

If the thickness of the boss around the 5/16-18 screw hole is above the profile of the gasket (from roughly the 10 o'clock to the 2 o'clock position), the material must be removed.

This is best accomplished by taking a permanent pen or paint marker and drawing around the gasket as shown in Figure 3. Remove the painted material roughly 1/2" back from the gasket surface of the case. A coarse flat file works well.

CHECK #2 - AUXILIARY FORK SHAFT BRIDGE CLEARANCE

The auxiliary fork shaft bridge comes installed on the inside of the side door as shown in Figure 4. The fork shaft bridge functions as the support for the 4th C/S gear fork shaft.

Again, use the side door gasket provided as your template and place it on the dowels. Notice the blue paint dot in the upper right hand corner of the gasket.

If any aluminum is present below the blue paint dot, paint the area 3/8" on either side of the blue dot as shown in Figure 5 and remove the material inward (perpendicular to gasket surface) roughly 1-3/8" from the gasket surface. A large coarse round file works well.

CHECK #3 - RIGHT SIDE PILLOW BLOCK CLEARANCE

The right side pillow block/roller detent assembly needs to be checked for proper fit to the case. The right side of the right pillow block needs to be checked for case clearance - see Figure 6.

Any gap greater than zero is acceptable as long as the pillow block detent assembly fits down square over the dowels. If you are installing a Six-Speed Overdrive™ into a Delkron® Softail® case, you will have to remove some material as shown in Figure 7.

Also check to make sure that some gap exists between the torsion spring and the side of the case is shown in Figure 9.

CHECK #4 - PRIMARY FORK ROD BOSS CLEARANCE

The boss in which the fork rod slides through must be checked for clearance for the 6th mainshaft gear. Once again, use the side door gasket as a template for this check.

Figure 8 shows the area of concern. If the thickness of the boss is outside the profile of the gasket in the 6 to 8 o'clock position, it must be removed. A large, coarse flat file works best.

CHECK #5 - AFTERMARKET CLUTCH RELEASE AND TOP COVER FIT

If you are installing aftermarket clutch release and top covers, you should check the fit of these covers onto the side door and over the shift drum, respectively.

ADJUSTMENTS/SET-UP AND CHECKS

The BAKER Six-Speed Overdrive™ has only two adjustments, just like the 5-speed. The first adjustment required is the shift drum end play which is different than the 5-Speed. The second adjustment is the shifter pawl eccentric adjusting screw, which is identical to 5-Speed and is performed as one of the last steps in the installation. On 2000 - up Softail and 2001 - up FLT/Dyna models (5 or 6 Speed), there is no eccentric adjustment screw, so no adjustment is necessary.

The 5-speed end play is adjusted/set- up on the detent side (right side) pillow block. In the 5-Speed design, axial thrust from the shift drum (during shifting) is controlled by the right side pillow block only. Both pillow blocks (left and right side) control the axial thrust on the Six-Speed Overdrive™. The shim to properly set up the end play is placed adjacent to the left side pillow block (Figure 10). Four shims are provided (a .036", .030", .024", and a .020" shim) to set up this clearance- **end play spec is .005"/- .003".**

Start by putting the .020" thick shim on the end of the shift drum. Place the shift drum/pillow block assembly onto the four dowels on top of the case. Put the four 1/4 - 20X1 1/4 cap screws w/ washers into the pillow block holes and tighten down the shift drum/pillow block assembly *squarely.* 'Squarely' means tighten down the four cap screws one turn *each* at a time to pull the pillow blocks down over the dowels*. A circular pattern for tightening the four cap screws works best. **NEVER RUN ONE CAP SCREW ALL THE WAY DOWN WITHOUT SEQUENTIALLY TIGHTENING THE OTHER THREE AS SPECIFIED ABOVE - *IRREPARABLE DAMAGE WILL RESULT!***

Most aftermarket cases have oversized pillow block dowels. The right side pillow block may be stubborn to make its way over the dowels. Tightening down the pillow block hex bolts in a circular pattern, as specified above, is usually sufficient to overcome this.

Measure the end play next to the right side pillow block as shown in Figure 11. Place the feeler gage in between the shim and the left side pillow block. If measured value is within spec., discard the other shims. When the end play is set to spec., confirm that the drum rotates freely by lifting up the detent lever with one hand and rotating the drum with the other. The drum should rotate freely. If the drum does not rotate freely, even though the end play was measured in spec., you must increase the end play. This *'potential'* situation can happen because the feeler gage only measures the end play at one radial point.

In the unlikely event the end play is less than the lower limit of .002 this could be due to variation in your housing, tolerance stack up of the BAKER™ hardware or a combination of both.

Regardless of the cause, it needs to be corrected. Please call BAKER™ and have some vernier calipers available to take measurements during your conversation to assist with diagnosis. If we determine that the difficulty is with your case, we will advise you how to remedy the situation. If the difficulty is with our hardware, we will ship replacement hardware overnight (domestic only) to remedy the situation.

WITH THE PRECEDING CHECKS AND SET UPS OUR OF THE WAY, YOU ARE NOW READY TO BEGIN THE INSTALLATION.

GEARSET INSTALLATION

New O.E. cases come with the P/N 8996 main drive gear bearing installed. For a new aftermarket case or any 'used' case, install a new main drive gear bearing and retaining ring as indicated below.

Remove the main drive gear (5th M/S) from the BAKER Six Speed Overdrive™ gearset/ trap door assembly by simply sliding it off the mainshaft. Install a new main drive gear bearing, O.E. P/N 8996 with a tool as mentioned in the special tools section of this manual. NEVER install the bearing into the case by applying pressure to the inner race - you will destroy the bearing. Install a new retaining ring with the bevel facing out.

Special Note: *2000 - up 88B Softail® transmission cases have a noted defect to the landing that supports the 8996A bearing. This landing comes straight from the factory with a very thin wall thickness and cracks in the corner between the landing and the 8996A bearing bore. Inspect carefully for this situation. When installing the new 8996A bearing, press it in carefully and don't crack the landing off of the case.*

Install the main drive gear into the main drive gear bearing using the same special tool.

Hang the side door gasket onto the case dowel pins and carefully push it down to the seat against the case gasket surface.

Apply some WD-40 or equivalent to the main drive gear seal and to the mainshaft (on the portion adjacent to the splines). Install the gearset by sliding the mainshaft through the main drive gear and slowly pushing the whole trap door/gearset assembly until the case dowel pins contact the dowel holes in the side door. A rubber hammer is helpful to tap the side door over the case dowel pins without risking any damage to the chrome plated aluminum side door. You may also use a slide hammer with a 1/4-30 tip for this task.

Install the four 5/16" SHCS (socket head cap screws) in the lower 4 screw holes and torque them to 13-16 ft lbs. Install the two 1/4" SHCS in the screw holes above each dowel and torque them to 7-9 ft lbs. At this time, check the fitment of the auxiliary fork shaft into the fork shaft bridge. If the fork shaft slides easily into the fork shaft bridge, take no action at this time. If the fork shaft does not slide easily into the fork shaft bridge, then put the auxiliary fork shaft in your freezer at this time. This will make the installation of the shaft much easier when the time comes to install it.

SHIFT FORK INSTALLATION

Figure 1 details the names of the 2 shift forks that are provided with this kit. Figure 13 details where these forks belong on the gearset. The 3rd C/S, 2nd M/S, and 1st M/S forks will ride on the primary fork rod (like 5-speed). The 4th C/S fork rides on the auxiliary shaft.

First, install the 1st M/S fork. You must slide the 1st gear away from the door and engage the dogs of the adjacent gear (4th) to allow room for the fork to slide on (Figure 12). Next, install the 4th C/S fork.

Install the 3rd C/S and 2nd M/S forks in the positions specified. Slide the primary fork rod through the 1st M/S fork, 3rd C/S fork, and 2nd M/S fork.

Remove the 1/2-20 set screw from the outside of the side door. Retrieve the auxiliary fork shaft from your freezer and install it into the access hole from which the 1/2-20 set screw was removed. You will have to drive it into the fork shaft bridge that is bolted to the opposite side of the door. While tapping the auxiliary fork shaft through with a brass hammer, hold onto the 4th C/S gear fork and make sure the fork is positioned correctly to receive the auxiliary fork shaft that is simultaneously being driven through.

Once the head of the auxiliary fork shaft is flush with the outside of the side door, you will need to drive it another 1/2" (carefully) into the door until you definitely feel it seat. A spare grade 2 (soft) bolt works well as a 'punch' to drive the auxiliary fork shaft to seat.

Put some Loctite 242 on the 1/2-20 set screw and torque it to 2-4 ft-lbs (tightly torqued); you will feel it seat against the head of the auxiliary fork shaft. Apply a generous amount of WD-40 or transmission oil to the forks and fork rods.

FUNCTION CHECK

With the 4 forks and the primary and secondary fork rods installed, check to make sure that the forks slide freely on the fork rods by moving them back and forth with your fingers. In particular, if you experience any binding of the 4th C/S fork, you most likely need to go back and perform clearance check #2 (in the Case Clearance Checks section) again as outlined in the previous section.

SHIFT DRUM/DETENT SYSTEM/PILLOW BLOCK INSTALLATION

Install the shift drum assembly as detailed in the **Adjustments/ Set-up and Checks** section. This time, however, you must be careful to make sure the fork pins are in the grooves in which they belong. As mentioned before, it is recommended that you tighten down the four cap screws in a circular pattern. Monitor closely the pins of the forks relative to the shift drum grooves. Application of Loctite 242 to the four cap screws is recommended. **Re-check the shift drum end play.**

Set the adjustment on the shifter pawl adjustment screw per the Factory Service Manual Section 7, SHIFTER LINKAGE adjustment.

CLUTCH ROD END - RIGHT SIDE

Transfer the thrust washers (2), thrust bearing, and retaining ring from your 5-speed right side rod end to the new rod end that has been provided with the kit. Install this rod end on the right side, at the end of the mainshaft, under the clutch cover.

CLUTCH RELEASE COVER INSTALLATION

Install your desired clutch release cover onto the side door. The only note is that two of the screw holes in the side door that receive two clutch cover screws have a threaded depth of 1/2". This means, if you are using an O.E.M. style clutch cover, you must use the two 1/4-20 x 2" SHCS that are provided, or any other SHCS with a 2" length. The positions of these two screw holes are shown in Figure 14.

SPEED SENSOR INSTALLATION

If you have a transmission case with speed sensor provisions, install the dummy plug and screw provided with your Builder's Kit in the case. Relocate the speed sensor to the provision in the side door. See Figure 14. You may require a speed sensor signal conversion box to correctly calibrate the speedo head. The new S&S units are available through BAKER DRIVETRAIN™. The new S&S units are sent to you pre-set so there is little or no 'dial in' required after installation.

FLUID FILL

Fluid capacity is 20-24 oz. of one of the following recommended oil.

If available at your local dealer, we highly recommend Red Line 'Heavy Shockproof' transmission oil. **Red Line oil can be purchased directly through Baker Drivetrain™.**

If Red Line is not available, then one of the following oils can be used:

Bel Ray 85W140
Spectro 75W140
Torco 85W140

ANCILLARY ITEMS

FLT Builder's Kits come with a modified oil spout because the stock oil spout does not clear the thicker side door. The modified oil spout is installed with the 5/16" adapter plate and the two gaskets provided (one on each side of the adapter plate) for proper fit.

In addition, the FLT® style exhaust bracket that bolts to the lower part of the side door using the four 5/16 screw holes in the case may have to be modified. Since the surface in which this bracket mounts to is .525" thicker than stock, experience shows that .400" should be laterally take out of the exhaust bracket to keep the exhaust pipe in the O.E.M. position. Modified brackets are available through BAKER™ at a cost of $25 if you do not have a hack saw and welder at your disposal.

DISASSEMBLY

In general, disassembly of your BAKER Six-Speed Overdrive™ is the reverse of content of the Installation Instructions with only one note; to remove the auxiliary fork shaft, you will need a slide hammer with a 10-32 threaded tip. An alternate method is to use a 2" long 10-32 bolt/screw. Thread the screw into the auxiliary fork shaft and grab the head of the screw with a set of vise grips. Give the vise grips a swift tug to extract the fork rod.

CUSTOMER SUPPORT

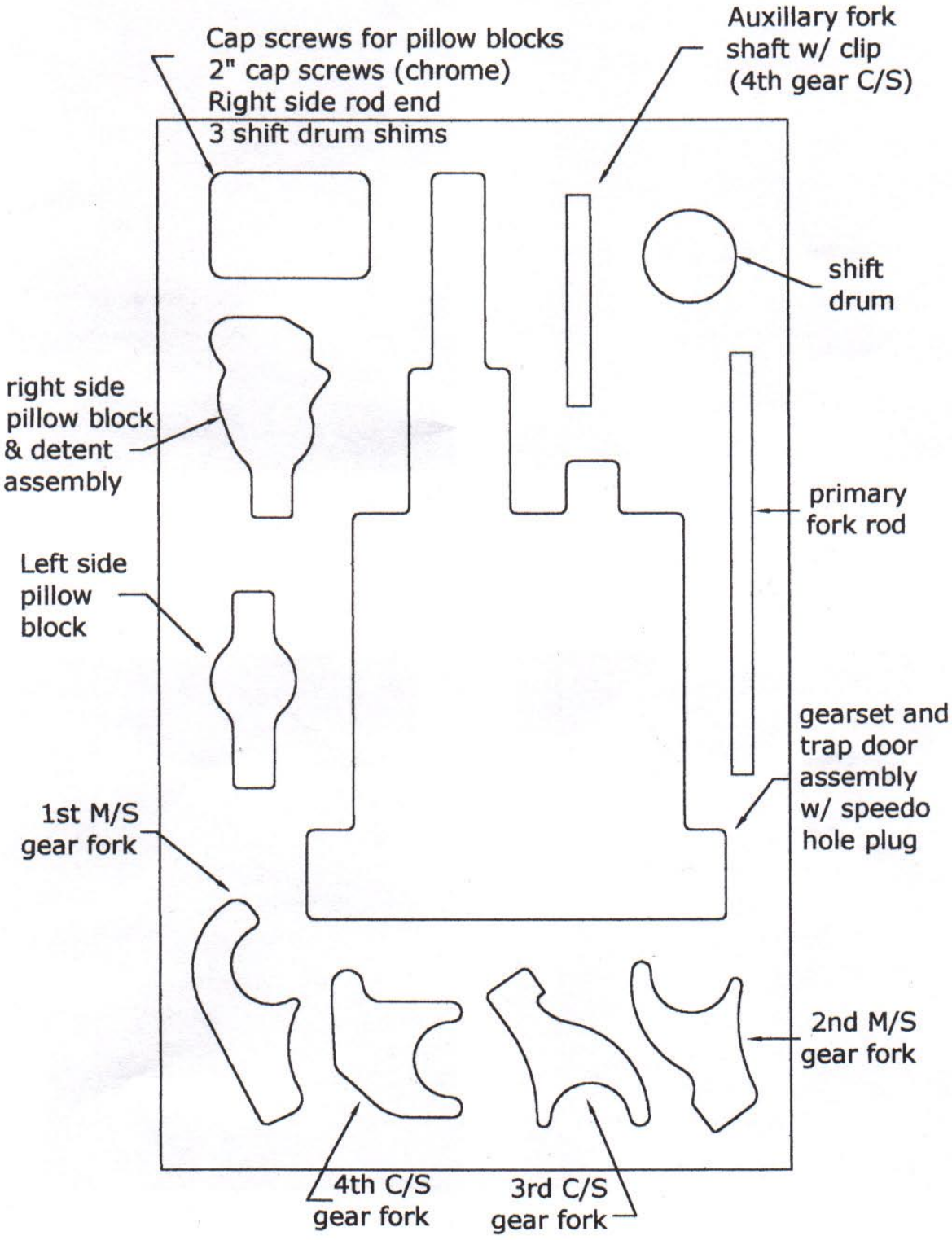
For any installation or service questions, please contact our technical department at (517) 339-3835.

DISCLAIMER

The words Harley®, H-D®, and Delkron® are registered trademarks and are for reference only. Use of the H-D® model designations and part numbers are for reference only. BAKER DRIVETRAIN™ has no association with, and makes no claims against, these words, trademarks, or companies.

The installation of these parts may void or otherwise adversely affect your factory warranty. If is the sole responsibility of the user to determine the suitability of this product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties and risks associated therewith.

Figure 1


Cap screws for pillow blocks
2" cap screws (chrome)
Right side rod end
3 shift drum shims
Auxillary fork shaft w/ clip (4th gear C/S)
shift drum
right side pillow block & detent assembly
primary fork rod
Left side pillow block
gearset and trap door assembly w/ speedo hole plug
1st M/S gear fork
2nd M/S gear fork
4th C/S gear fork
3rd C/S gear fork

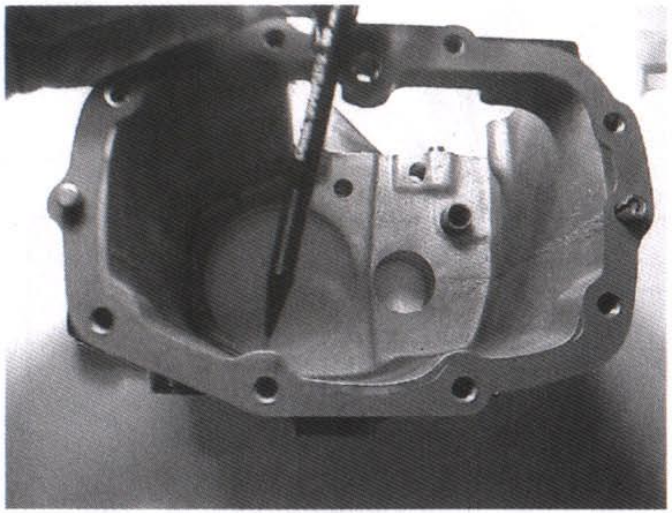


Figure 2

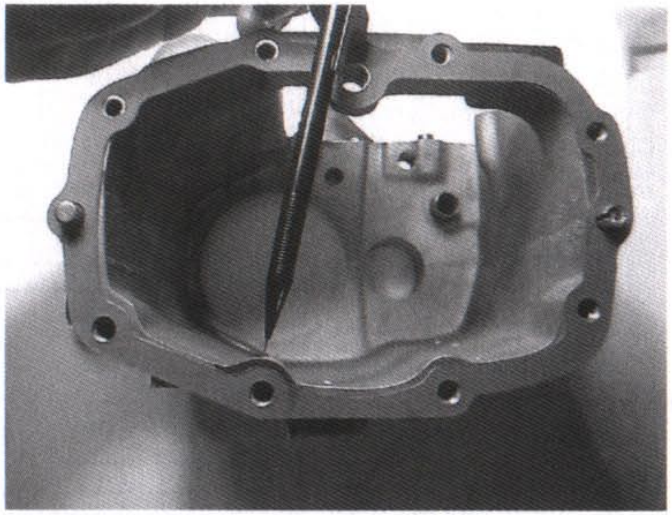


Figure 3

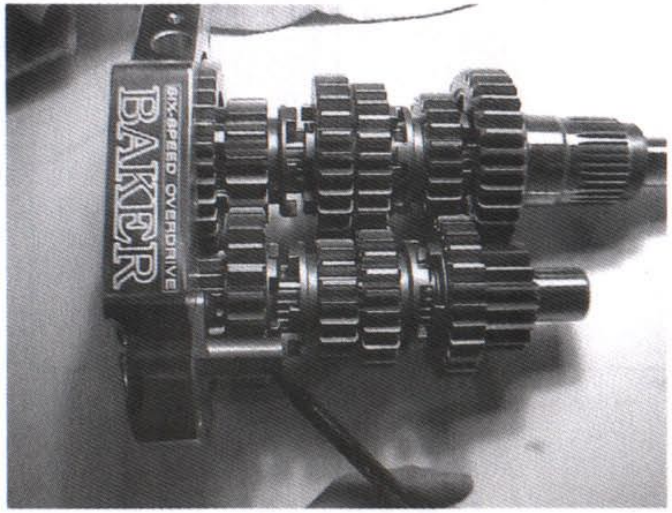


Figure 4

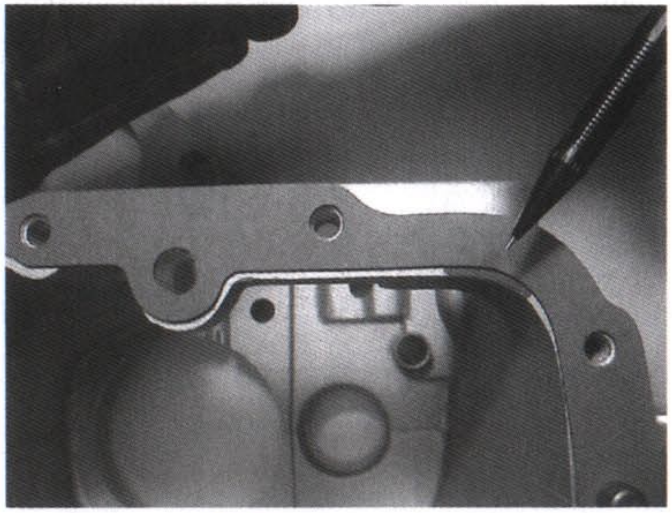


Figure 5

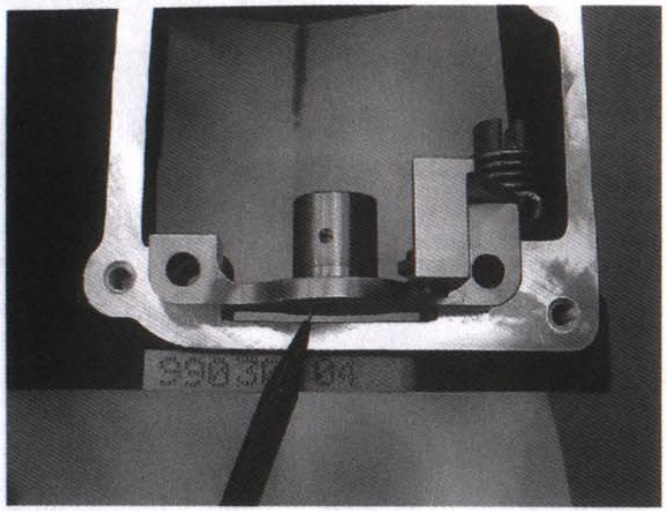


Figure 6

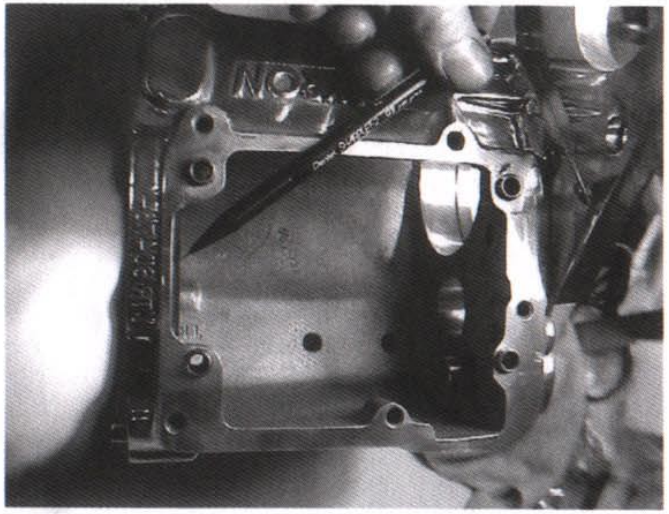


Figure 7

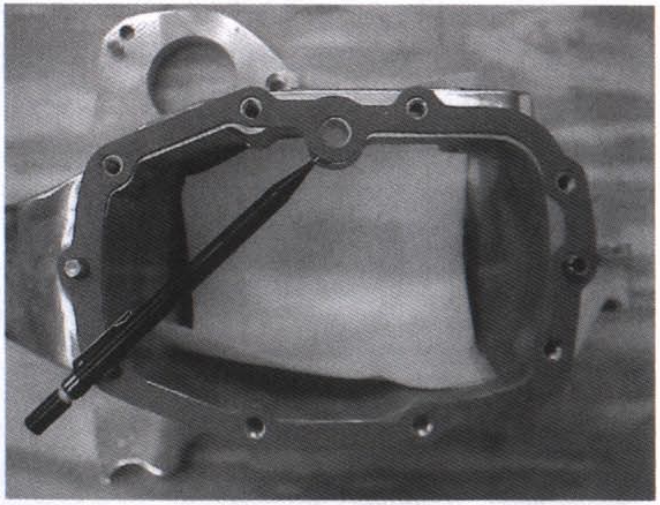


Figure 8

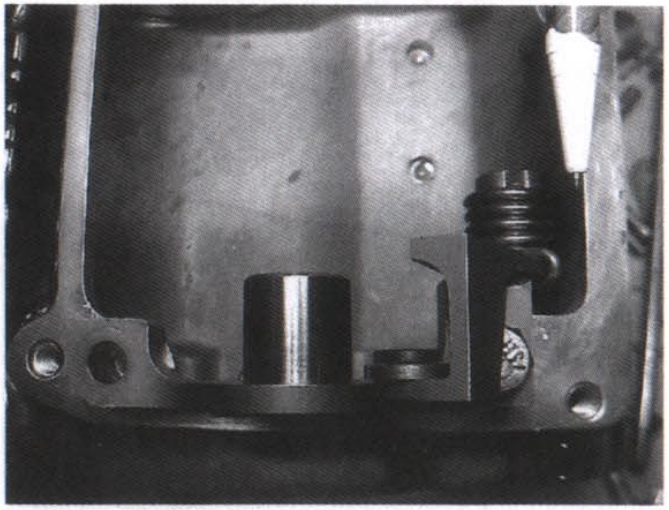


Figure 9

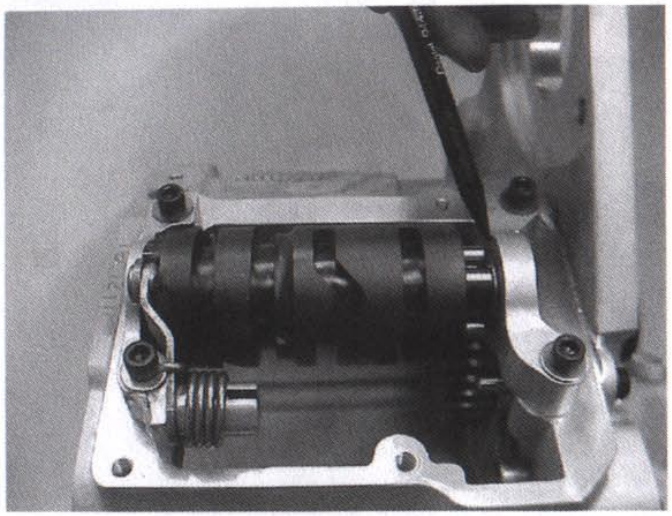


Figure 10

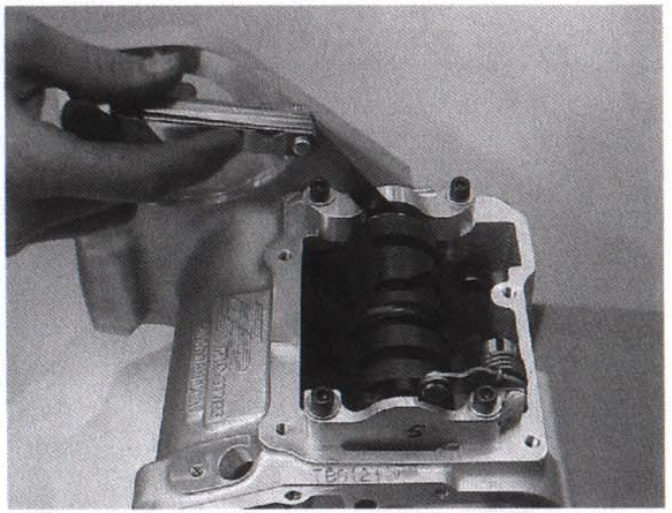


Figure 11

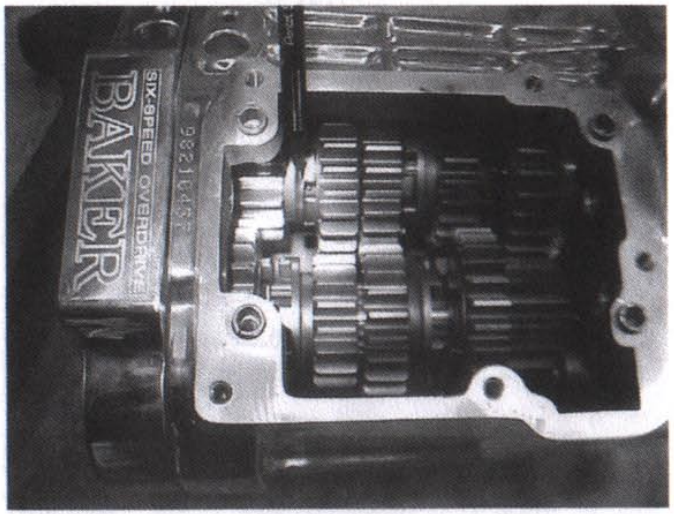


Figure 12

Figure 13

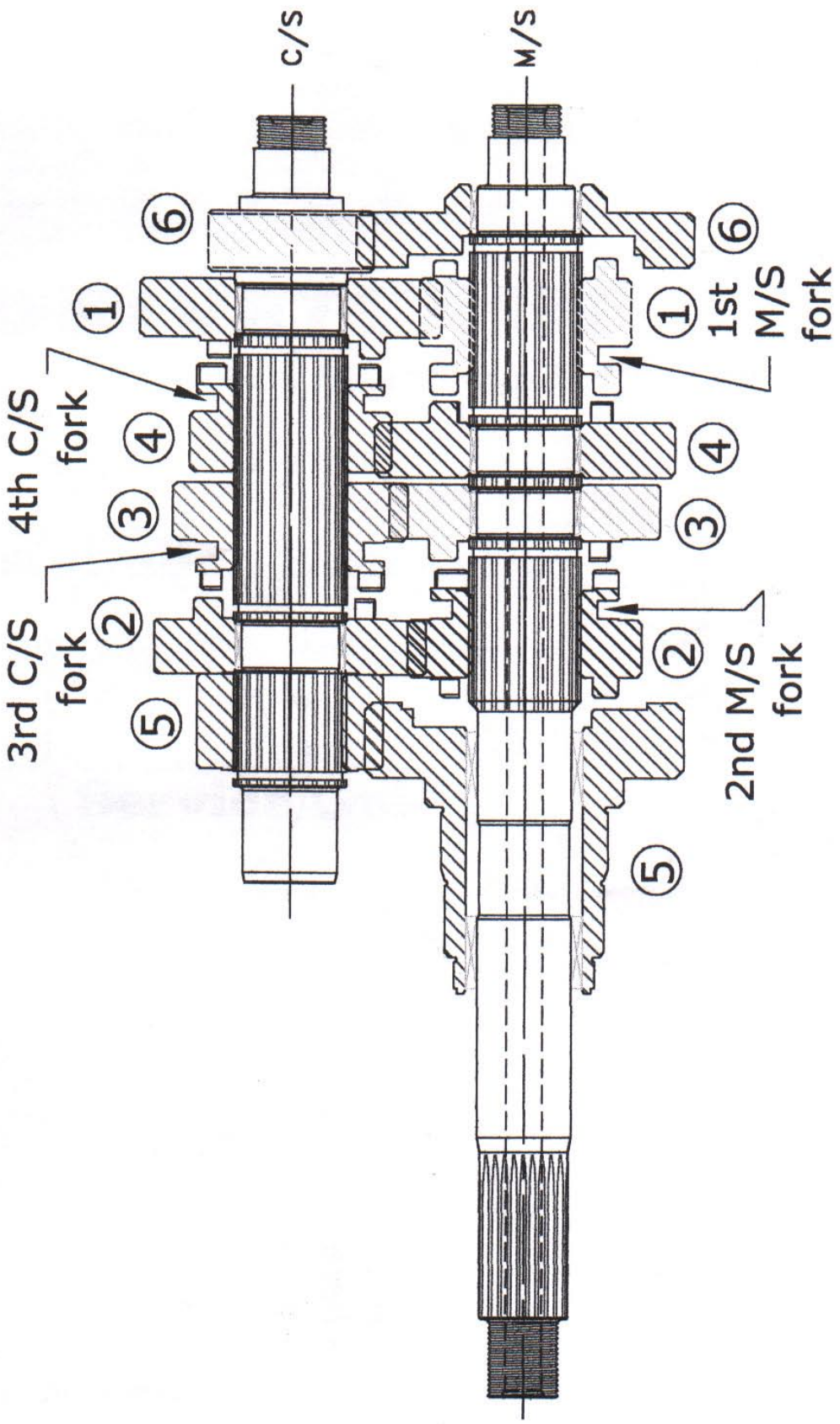

c/s
M/S
6
1
4th C/S
fork
4
3
3rd C/S
fork
2
5
1st
M/S
fork
6
1
4
3
2nd M/S
fork
2
5

Figure 14